



SEQUENCE LISTING

<110> Falco, S. Carl
Cahoon, Rebecca E.

<120> Vitamin B Metabolism Proteins

<130> BB-1201 US DIV

<140> 10/081,301

<141> 2002-02-20

<150> 60/096,342

<151> 1998-08-12

<160> 16

<170> Microsoft Office 97

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<211> 933

<212> DNA

<213> Zea mays

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ctccttggct ttgatgtgga tccaataaac tctgtacagt tttctaatac tacaggatac 180
ccaacattta gaggtcaggt tcttaatggc aaacagctct gggaccttat tgaaggactg 240
gaggaaaatc agttgcttca ttatacccat ttattaacag gttatatagg ctcatgttcc 300
tttttagata ctgtgctaca agttgttgag aaattgcat cagttaatcc tgatcttgta 360
tatgtttgtg acccagttct aggtgatgaa ggaaaactat atgttcctca ggaggtaata 420
tctgtttatc aacagaaggt tgttccagtt gcttcaatgc ttacacctaa ccaatttgaa 480
gttgaactac ttactggatt gaggatcacc tccgaagaag atggtttgac agcttgtaat 540
accctccaca gtgccggacc acagaaggtg gttataacta gtgctcttat tgaaggtaag 600
ctgctcctta tcggaagtca caaaaaaaca ggaactggag agccagaaca atttaagatt 660
gagataccaa agatacctgc atatttcacg ggaactggag atttgacaac tgctctccta 720
ctaggatgga gtaataaata tcctgatagc ctcgagaaag cagcagaact ggcagtttcc 780
agtttgagg cacttctgaa aagaactgtg gaagactata aaatggccgg cttcgaccca 840
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<210> 2

<211> 310

<212> PRT

<213> Zea mays

<400> 2

Met Ala Arg Pro Pro Ile Leu Ser Val Ala Leu Pro Ser Asp Thr Gly
1 5 10 15

Arg Val Leu Ser Ile Gln Ser His Thr Val Gln Gly Tyr Val Gly Asn
20 25 30

Lys Ser Ala Val Phe Pro Leu Gln Leu Leu Gly Phe Asp Val Asp Pro
35 40 45

Ile Asn Ser Val Gln Phe Ser Asn His Thr Gly Tyr Pro Thr Phe Arg
50 55 60

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27

Gly Gln Val Leu Asn Gly Lys Gln Leu Trp Asp Leu Ile Glu Gly Leu
 65 70 75 80
 Glu Glu Asn Gln Leu Leu His Tyr Thr His Leu Leu Thr Gly Tyr Ile
 85 90 95
 Gly Ser Val Ser Phe Leu Asp Thr Val Leu Gln Val Val Glu Lys Leu
 100 105 110
 Arg Ser Val Asn Pro Asp Leu Val Tyr Val Cys Asp Pro Val Leu Gly
 115 120 125
 Asp Glu Gly Lys Leu Tyr Val Pro Gln Glu Val Ile Ser Val Tyr Gln
 130 135 140
 Gln Lys Val Val Pro Val Ala Ser Met Leu Thr Pro Asn Gln Phe Glu
 145 150 155 160
 Val Glu Leu Leu Thr Gly Leu Arg Ile Thr Ser Glu Glu Asp Gly Leu
 165 170 175
 Thr Ala Cys Asn Thr Leu His Ser Ala Gly Pro Gln Lys Val Val Ile
 180 185 190
 Thr Ser Ala Leu Ile Glu Gly Lys Leu Leu Leu Ile Gly Ser His Lys
 195 200 205
 Lys Thr Glu Glu Gln Gln Pro Glu Gln Phe Lys Ile Glu Ile Pro Lys
 210 215 220
 Ile Pro Ala Tyr Phe Thr Gly Thr Gly Asp Leu Thr Thr Ala Leu Leu
 225 230 235 240
 Leu Gly Trp Ser Asn Lys Tyr Pro Asp Ser Leu Glu Lys Ala Ala Glu
 245 250 255
 Leu Ala Val Ser Ser Leu Gln Ala Leu Leu Lys Arg Thr Val Glu Asp
 260 265 270
 Tyr Lys Met Ala Gly Phe Asp Pro Ser Thr Ser Ser Leu Glu Ile Arg
 275 280 285
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 290 295 300
 Ala Val Lys Tyr Gly Ser
 305 310

<210> 3
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 <212> DNA
 <213> Oryza sativa

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 <223> n = a, c, g or t

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<220>
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<223> n = a, c, g or t

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agcaaaggaa caaccaccag aacaatttaa gattgagata cccaagatac ctgcatattt 180
cacgggcact ggagatttaa caactgccct tctactagga tggagtaata aataccctga 240
taaccttggga gagggcgctg aactggcggt atccatttgc aaggcacccc taaggagaac 300
tgtggaagac tataaaagac tgggtttgac cctccaacca acacctagag atccgcctgg 360
attcaaaacc aaggatgaan tccnaagncc caagatacat gcaagctgtg aaa 413

<210> 4
<211> 136
<212> PRT
<213> Oryza sativa

<220>
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<222> (127)..(128)..(129)
<223> Xaa = any amino acid

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1 5 10 15
Gly Pro Arg Lys Val Val Ile Thr Ser Ala Leu Ile Glu Asp Lys Leu
20 25 30
Leu Leu Ile Gly Ser His Lys Lys Ala Lys Glu Gln Pro Pro Glu Gln
35 40 45
Phe Lys Ile Glu Ile Pro Lys Ile Pro Ala Tyr Phe Thr Gly Thr Gly
50 55 60
Asp Leu Thr Thr Ala Leu Leu Leu Gly Trp Ser Asn Lys Tyr Pro Asp
65 70 75 80
Asn Leu Gly Glu Gly Ala Glu Leu Ala Val Ser Ile Cys Lys Ala Pro
85 90 95
Leu Arg Arg Thr Val Glu Asp Tyr Lys Arg Leu Gly Leu Thr Leu Gln
100 105 110
Pro Thr Pro Arg Asp Pro Pro Gly Phe Lys Thr Lys Asp Glu Xaa Xaa
115 120 125
Xaa Pro Lys Ile His Ala Ser Cys

29

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<211> 812
<212> DNA
<213> Glycine max

<220>
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<222> (577)
<223> n = a, c, g or t

<220>
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<220>
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<223> n = a, c, g or t

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<222> (742)
<223> n = a, c, g or t

<220>
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<222> (744)
<223> n = a, c, g or t

<220>
<221> unsure
<222> (746)
<223> n = a, c, g or t

<220>
<221> unsure
<222> (755)
<223> n = a, c, g or t

<220>
<221> unsure
<222> (760)
<223> n = a, c, g or t

<220>
<221> unsure
<222> (769)
<223> n = a, c, g or t

<220>
<221> unsure
<222> (778)

20

<223> n = a, c, g or t

<220>

<221> unsure

<222> (785)..(786)

<223> n = a, c, g or t

<220>

<221> unsure

<222> (792)

<223> n = a, c, g or t

<220>

<221> unsure

<222> (804)

<223> n = a, c, g or t

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aggggtatgt tggtaataaa tccgctgtct tccctctgca actactggga tatgatgtcg 180
atccaattaa ttccgtgcag ttttcgaatc atacaggata tccgacgttt aagggtcagg 240
ttttgaatgg acagcaactc tgggatctaa tcgaaggcct tgaaggaaat gatttattgt 300
tctatactca cttgctaaca ggttatattg gttcagagtc ttttctaaac actgtattgc 360
aagttgtcag caaacttcgg tcaacaaacc caggtctttc gtatgtatgt gatccagtga 420
tgggtgatga aggaaagctt tatgttcctc aagagctagt atcagtctat cgtgagaagg 480
ttgttccagt agcttcaatg ttgactccca accagtttga agcagaacta ctgacaggct 540
ttaggattca gtctgaagga catggccggg aggctgntag gcttctccat gcagctgggc 600
cttcaaaggn cataattaca agtataaata tagacgggat tcttctcctc attggcagtc 660
atccaaaaga aaaggagag ccnccngac aatttaagat tgttattcca aaaataacca 720
gcttatttta cgggaacggg anancncatg actgnattcn tcttggttng agcataanta 780
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<210> 6

<211> 196

<212> PRT

<213> Glycine max

<220>

<221> UNSURE

<222> (178)

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<220>

<221> UNSURE

<222> (189)

<223> Xaa = any amino acid

<400> 6

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Val Leu Ser Ile Gln Ser His Thr Val Gln Gly Tyr Val Gly Asn Lys
20 25 30

Ser Ala Val Phe Pro Leu Gln Leu Leu Gly Tyr Asp Val Asp Pro Ile
35 40 45

Asn Ser Val Gln Phe Ser Asn His Thr Gly Tyr Pro Thr Phe Lys Gly
50 55 60

31

Gln Val Leu Asn Gly Gln Gln Leu Trp Asp Leu Ile Glu Gly Leu Glu
65 70 75 80

Gly Asn Asp Leu Leu Phe Tyr Thr His Leu Leu Thr Gly Tyr Ile Gly
85 90 95

Ser Glu Ser Phe Leu Asn Thr Val Leu Gln Val Val Ser Lys Leu Arg
100 105 110

Ser Thr Asn Pro Gly Leu Ser Tyr Val Cys Asp Pro Val Met Gly Asp
115 120 125

Glu Gly Lys Leu Tyr Val Pro Gln Glu Leu Val Ser Val Tyr Arg Glu
130 135 140

Lys Val Val Pro Val Ala Ser Met Leu Thr Pro Asn Gln Phe Glu Ala
145 150 155 160

Glu Leu Leu Thr Gly Phe Arg Ile Gln Ser Glu Gly His Gly Arg Glu
165 170 175

Ala Xaa Arg Leu Leu His Ala Ala Gly Pro Ser Lys Xaa Ile Ile Thr
180 185 190

Ser Ile Asn Ile
195

<210> 7
<211> 773
<212> DNA
<213> Triticum aestivum

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atccagtccc acaccgtcca ggggtatgtt ggcaacaaat cggccgtctt tcccctgcag 120
ctccttggct ttgatgtgga tccaataaac tctgtacagt tttctaataca tacaggatac 180
ccaacattta gagggtcagt tcttaatggc aaacagctct gggaacttat tgaaggactg 240
gaggaaaatc agctgcttca ttatacccat ttattaacag gttatatagg ctcagtttcc 300
tttttagata ctgtgctaca agttgttgag aaattgcat cagttaatcc tgatcttgta 360
tatgtttgtg acccagttct aggtgatgaa ggaaaactat atgttcctca ggagctaata 420
tctgtttatc aacagaaggt tgttccagtt gcttcaatgc ttacaccata ccaatttgaa 480
gttgaactac ttactggatt gaggatcacc tccgaagaag atggtttgac agcttgtaat 540
accctccaca gtgccggacc acagaagggt gttataacta gtgctcttat tgaaggtaag 600
ctgctcctta tcggaagtca caaaaaaaca gaggaacaac agccagaaca atttaagatt 660
gagataccaa agatacctgc atatttcacg ggaactggag atttgacaac tgctctccta 720
ctaggatgga gtaataaata tcttgatata ctcgaggggg ggccgtacca aat 773

<210> 8
<211> 256
<212> PRT
<213> Triticum aestivum

<400> 8
Met Ala Arg Pro Pro Ile Leu Ser Val Ala Leu Pro Ser Asp Thr Gly
1 5 10 15

Arg Val Leu Ser Ile Gln Ser His Thr Val Gln Gly Tyr Val Gly Asn
20 25 30

32

Lys Ser Ala Val Phe Pro Leu Gln Leu Leu Gly Phe Asp Val Asp Pro
 35 40 45
 Ile Asn Ser Val Gln Phe Ser Asn His Thr Gly Tyr Pro Thr Phe Arg
 50 55 60
 Gly Ser Val Leu Asn Gly Lys Gln Leu Trp Glu Leu Ile Glu Gly Leu
 65 70 75 80
 Glu Glu Asn Gln Leu Leu His Tyr Thr His Leu Leu Thr Gly Tyr Ile
 85 90 95
 Gly Ser Val Ser Phe Leu Asp Thr Val Leu Gln Val Val Glu Lys Leu
 100 105 110
 Arg Ser Val Asn Pro Asp Leu Val Tyr Val Cys Asp Pro Val Leu Gly
 115 120 125
 Asp Glu Gly Lys Leu Tyr Val Pro Gln Glu Leu Ile Ser Val Tyr Gln
 130 135 140
 Gln Lys Val Val Pro Val Ala Ser Met Leu Thr Pro Asn Gln Phe Glu
 145 150 155 160
 Val Glu Leu Leu Thr Gly Leu Arg Ile Thr Ser Glu Glu Asp Gly Leu
 165 170 175
 Thr Ala Cys Asn Thr Leu His Ser Ala Gly Pro Gln Lys Val Val Ile
 180 185 190
 Thr Ser Ala Leu Ile Glu Gly Lys Leu Leu Leu Ile Gly Ser His Lys
 195 200 205
 Lys Thr Glu Glu Gln Gln Pro Glu Gln Phe Lys Ile Glu Ile Pro Lys
 210 215 220
 Ile Pro Ala Tyr Phe Thr Gly Thr Gly Asp Leu Thr Thr Ala Leu Leu
 225 230 235 240
 Leu Gly Trp Ser Asn Lys Tyr Pro Asp Ile Leu Glu Gly Gly Tyr Gln
 245 250 255

<210> 9
 <211> 828
 <212> DNA
 <213> Zea mays

<220>
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 <222> (74)
 <223> n = a, c, g or t

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 tcctttaccc tgggcacatc aatgtgtgtg agaattggaa aagctccatc tgttgaaatt 180
 tcattctctca gggagaacta tatttcccct gaacttcttg agagtcaagt gatgtctgat 240
 ccatttgatc agttccttaa atggtttgat gaagcagtaa cagccggtcc cggctctcgt 300
 gagccaatg caatggcttt gacaactgcc aacaaggaag gaaaaccttc ttcgaggatg 360
 gttcttttaa agggagttga taaacagggg tttgtttggt atacaaatta tggtagccgg 420

33

aaggcgcatg acttgtgtga aaaccctaac gcagcactcc ttttctactg gaatgagatg 480
aaccgtcagg taagagttga agggtcagtt gagaaggttc cagaagctga atcagataaa 540
tatttccaca gccgcccacg tgggaagtcag cttggtgcc tagtcagcaa gcagagtact 600
gtaattgctg gaagagaagt tcttcaacag gattacaaga aattggaaca aaaatattct 660
gatgggagct tgattccaaa acctgaatat tgggggtggct acaaattgac accgacactt 720
tttgagttct ggcaaggaca acagtctcga ctgcatgacc gggtacaata ctgcagaga 780
gaagtagatg ggagcacagt gtggcacatc gagaggttgt ccccttga 828

<210> 10
<211> 275
<212> PRT
<213> Zea mays

<220>
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<222> (25)
<223> Xaa = any amino acid

<400> 10

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Gly Pro His His Phe Leu Gly Gly Xaa Phe Val Pro Pro Pro Ile Leu
20 25 30
Asn Gln Leu Arg Asp Phe Ser Ser Phe Thr Leu Gly Thr Ser Met
35 40 45
Cys Val Arg Ile Gly Lys Ala Pro Ser Val Glu Ile Ser Ser Leu Arg
50 55 60
Glu Asn Tyr Ile Ser Pro Glu Leu Leu Glu Ser Gln Val Met Ser Asp
65 70 75 80
Pro Phe Asp Gln Phe Leu Lys Trp Phe Asp Glu Ala Val Thr Ala Gly
85 90 95
Pro Gly Leu Arg Glu Pro Asn Ala Met Ala Leu Thr Thr Ala Asn Lys
100 105 110
Glu Gly Lys Pro Ser Ser Arg Met Val Leu Leu Lys Gly Val Asp Lys
115 120 125
Gln Gly Phe Val Trp Tyr Thr Asn Tyr Gly Ser Arg Lys Ala His Asp
130 135 140
Leu Cys Glu Asn Pro Asn Ala Ala Leu Leu Phe Tyr Trp Asn Glu Met
145 150 155 160
Asn Arg Gln Val Arg Val Glu Gly Ser Val Glu Lys Val Pro Glu Ala
165 170 175
Glu Ser Asp Lys Tyr Phe His Ser Arg Pro Arg Gly Ser Gln Leu Gly
180 185 190
Ala Ile Val Ser Lys Gln Ser Thr Val Ile Ala Gly Arg Glu Val Leu
195 200 205
Gln Gln Asp Tyr Lys Lys Leu Glu Gln Lys Tyr Ser Asp Gly Ser Leu
210 215 220



Ile Pro Lys Pro Glu Tyr Trp Gly Gly Tyr Lys Leu Thr Pro Thr Leu
225 230 235 240

Phe Glu Phe Trp Gln Gly Gln Gln Ser Arg Leu His Asp Arg Leu Gln
245 250 255

Tyr Ser Gln Arg Glu Val Asp Gly Ser Thr Val Trp His Ile Glu Arg
260 265 270

Leu Ser Pro
275

<210> 11
<211> 555
<212> DNA
<213> Oryza sativa

<220>
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<220>
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<223> n = a, c, g or t

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<223> n = a, c, g or t

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ccatatcccg gtacctcaat gtgtgtgaga attggaaaag ctccatctgt tgacatttca 180
tctctaagaa gaaattacat ctcccctgaa cttctcgagn aacagggtgat gcctgatcca 240
tttgataant tcgttagatg gtttgatgaa ctgttacgct ggctacgtga accaaatgct 300
atgggtaaca actccgataa ggagggaataa cttcgcaaag aatggccttt aangnggttg 360
ataaccacgg attttttggg ancaattntg ganccaaaag gacatgatta cctgaaacca 420
aatgngccn gttncantgg aaggaataac ggcagtaaaa taaagtctgt canangtcca 480
gaaaagactg agattttcaa cncanagga ataacttng aatntcacac angcanncat 540
ctganggant ncagg 555

<210> 12
<211> 110
<212> PRT
<213> Oryza sativa

<220>
<221> UNSURE
<222> (74)
<223> Xaa = any amino acid

<220>
<221> UNSURE
<222> (83)
<223> Xaa = any amino acid

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Gly Pro His His Phe Leu Gly Gly Arg Phe Val Pro Pro Pro Ile Val
20 25 30
Ser Lys Tyr Lys Leu His Leu Pro Pro Tyr Pro Gly Thr Ser Met Cys
35 40 45
Val Arg Ile Gly Lys Ala Pro Ser Val Asp Ile Ser Ser Leu Arg Arg
50 55 60
Asn Tyr Ile Ser Pro Glu Leu Leu Glu Xaa Gln Val Met Pro Asp Pro
65 70 75 80
Phe Asp Xaa Phe Val Arg Trp Phe Asp Glu Leu Leu Arg Trp Leu Arg
85 90 95
Glu Pro Asn Ala Met Val Asn Asn Ser Asp Lys Glu Gly Lys
100 105 110

<210> 13
<211> 864
<212> DNA

81

<213> `Glycine max`

<400> 13

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tttgtccac ctgctattgc agaaaaatat aagcttatac ttccaccata tcctggaact 180
tccatgtgtg ttgcaattgg aaggcctcca cgtattgata tctcagctct aagagagaac 240
tatatctctc cagaatttct tgaagagcag gtggaggctg acccttttaa tcagtttcat 300
aaatggttta atgatgcatt ggctgctggt ttgaaggaac caaatgctat gtccttgtca 360
actgtaggga aggacggaaa accctcatca agaattggtat tgctaaaagg cttggataag 420
gaaggatttg tgtggtacac aaactatgaa agtcgaaagg cacgtgaatt atctgaaaat 480
ccacgtgcat cacttctttt ttactgggat gggttaaacc ggcaggtagc ggtggaaggg 540
cctgttcaga aagtctctga tgaggaatca gaacagtatt tccatagccg ccctagaggt 600
agtcagattg gagcaatagt cagcaagcag agtactgtag tgccgggtag gcatgttctt 660
tatcaggagt acaaagagct ggaagaaaaa tactctgatg gaagttaa atccctaaac 720
aagaactggg gtggatatag gctaacacca caacttttcg agttttggca agggcagaaa 780
tctcgttgc atgacagggt gcaatatact ccccatgaga tcaatggaca acggctgtgg 840
aaggttgacc ggttggtccc ttga 864

<210> 14

<211> 287

<212> PRT

<213> Glycine max

<400> 14

Met Leu Lys Arg Glu Asp Val Asp Gly Thr Gly Ile Lys Pro Asp Met
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20 25 30
Pro His His Phe Leu Gly Gly Arg Phe Val Pro Pro Ala Ile Ala Glu
35 40 45
Lys Tyr Lys Leu Ile Leu Pro Pro Tyr Pro Gly Thr Ser Met Cys Val
50 55 60
Arg Ile Gly Arg Pro Pro Arg Ile Asp Ile Ser Ala Leu Arg Glu Asn
65 70 75 80
Tyr Ile Ser Pro Glu Phe Leu Glu Glu Gln Val Glu Ala Asp Pro Phe
85 90 95
Asn Gln Phe His Lys Trp Phe Asn Asp Ala Leu Ala Ala Gly Leu Lys
100 105 110
Glu Pro Asn Ala Met Ser Leu Ser Thr Val Gly Lys Asp Gly Lys Pro
115 120 125
Ser Ser Arg Met Val Leu Leu Lys Gly Leu Asp Lys Glu Gly Phe Val
130 135 140
Trp Tyr Thr Asn Tyr Glu Ser Arg Lys Ala Arg Glu Leu Ser Glu Asn
145 150 155 160
Pro Arg Ala Ser Leu Leu Phe Tyr Trp Asp Gly Leu Asn Arg Gln Val
165 170 175
Arg Val Glu Gly Pro Val Gln Lys Val Ser Asp Glu Glu Ser Glu Gln
180 185 190

38

Tyr Phe His Ser Arg Pro Arg Gly Ser Gln Ile Gly Ala Ile Val Ser
195 200 205

Lys Gln Ser Thr Val Val Pro Gly Arg His Val Leu Tyr Gln Glu Tyr
210 215 220

Lys Glu Leu Glu Glu Lys Tyr Ser Asp Gly Ser Leu Ile Pro Lys Pro
225 230 235 240

Lys Asn Trp Gly Gly Tyr Arg Leu Thr Pro Gln Leu Phe Glu Phe Trp
245 250 255

Gln Gly Gln Lys Ser Arg Leu His Asp Arg Leu Gln Tyr Thr Pro His
260 265 270

Glu Ile Asn Gly Gln Arg Leu Trp Lys Val Asp Arg Leu Ala Pro
275 280 285

<210> 15
<211> 456
<212> DNA
<213> Triticum aestivum

<400> 15
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agagtagaag ggtcgggtca gaaggtctca gaagaagaat ctgagaagta tttccacagc 180
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Val Ser Glu Glu Glu Ser Glu Lys Tyr Phe His Ser Arg Pro Arg Gly
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Ser Gln Leu Gly Ala Ile Val Ser Lys Gln Ser Thr Val Ile Ser Arg
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Glu Val Leu Gln Gln Ala Tyr Lys Glu Leu Glu Gln Lys Tyr Ser Asp
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Gly Ser Phe Ile Pro Lys Pro Asp Tyr Trp Gly Gly Tyr Lys Leu Thr
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127

Pro Asn Leu Phe Glu Phe Trp Gln Gly Gln Gln Ser Arg Leu His Asp
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Arg Leu Gln Tyr Ser Gln Arg Glu Leu Gly Gly Ser Thr Glu Trp His
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Ile Gln Arg Leu Ser Pro
145 150

